Fisheries and Oceans Canada | Pêches et Océans Canada
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Canadian Science Advisory Secretariat
Maritimes Region | Science Response 2016/004

# LOBSTER (*HOMARUS AMERICANUS*) IN LOBSTER FISHING AREA 41 (4X + 5Zc): 2015 STOCK STATUS UPDATE

## Context

The status of the lobster resource in Lobster Fishing Area (LFA) 41 was last assessed in December 2013 (DFO 2014, Pezzack et al. 2015). A Precautionary Approach proposed for lobster in LFA 41 uses multiple primary indicators with boundaries to guide in setting harvest control rules and secondary indicators to aid in interpreting changes in the primary indicators. There is no single reference point for this fishery. This Science Response updates primary indicators to 2015. Two primary indicators from the U.S. Research Vessel (RV) trawl survey were not available for inclusion in this science response update.

This Science Response Report results from the Science Response Process of October 6, 2015, on the 2015 Lobster Fishing Area (LFA) 41 Lobster Stock Status Update.

## Background

Commercial lobster fishing in LFA 41 (Figure 1) occurs offshore, from the 50 nautical mile line (92 km) to the upper continental slope, within Northwest Atlantic Fisheries Organization (NAFO) Divisions 4X and 5Zc.

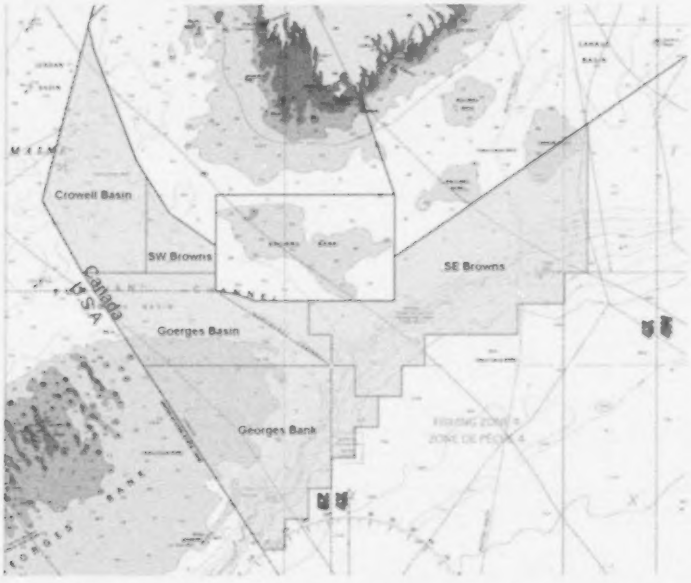



*Figure 1. Map showing LFA 41 offshore subareas used for primary indicators (4X - Crowell Basin, SW Brown, and SE Browns, and 5Z - Georges Basin and Georges Bank).*

The LFA 41 fishery operates under the Integrated Fisheries Management Plan with 8 licenses and a total allowable catch (TAC) of 720 tonnes (t). The TAC was established in 1985 based on

landings history and has remained unchanged since that time (Figure 2). It is the only lobster fishery in Canada that is managed with a TAC. This fishery has also maintained a Marine Stewardship Council (MSC) eco-certification since 2010.

## Analysis and Response

Primary abundance indicators are based on the mean number of lobsters per tow in Fisheries and Oceans Canada (DFO) Maritimes Region RV trawl surveys. The U.S. RV trawl survey indicators are not updated here because of issues related to data selection. Median size of females in trawl surveys and in at-sea samples of the commercial catch are the indicators linked to fishing pressure and reproduction. The values for the primary indicators updated here are above the upper boundaries (Figure 3). The LFA 41 stock is considered to be in the healthy zone.

### Number per Tow in RV Surveys

Stratified mean number of lobsters per tow from the DFO Maritimes Region Summer RV trawl survey (4X) for the last 36 years (1980-2015) indicate that recent catch rates are among the highest on record (Figure 4). The upper boundary is based on 50% of the median survey catch of the 1995-2009 period (1.48) and the lower boundary is based on 40% of the median survey catch of the 1983-1994 period (0.16). The metric for assessing where the catch rate is relative to the upper boundary is the 3-year moving average of the mean survey catch. For 2015, this metric is 13.76 lobsters per tow, which is above the upper boundary.

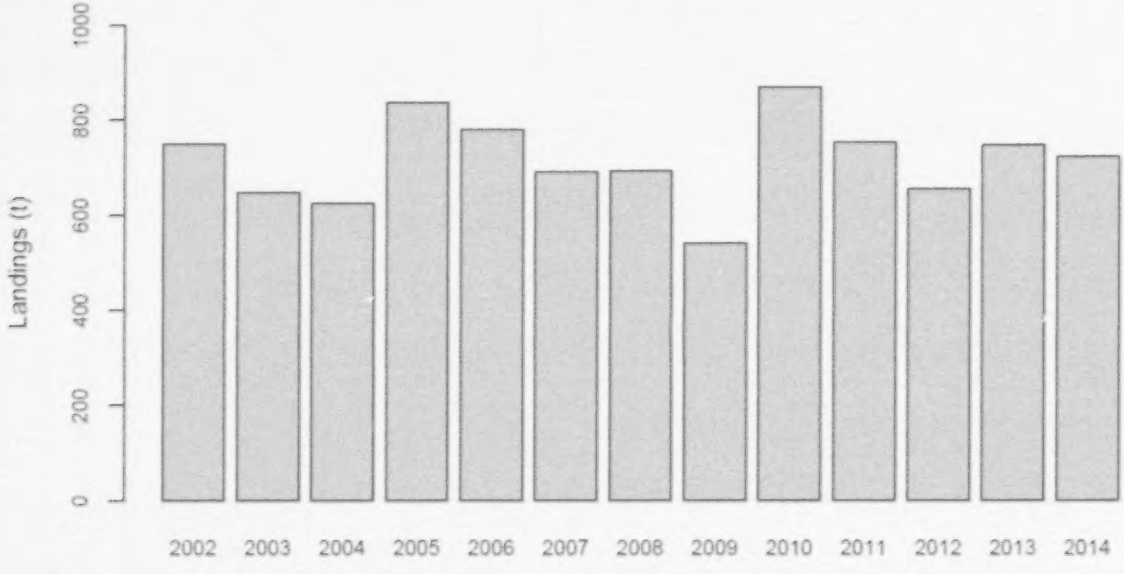
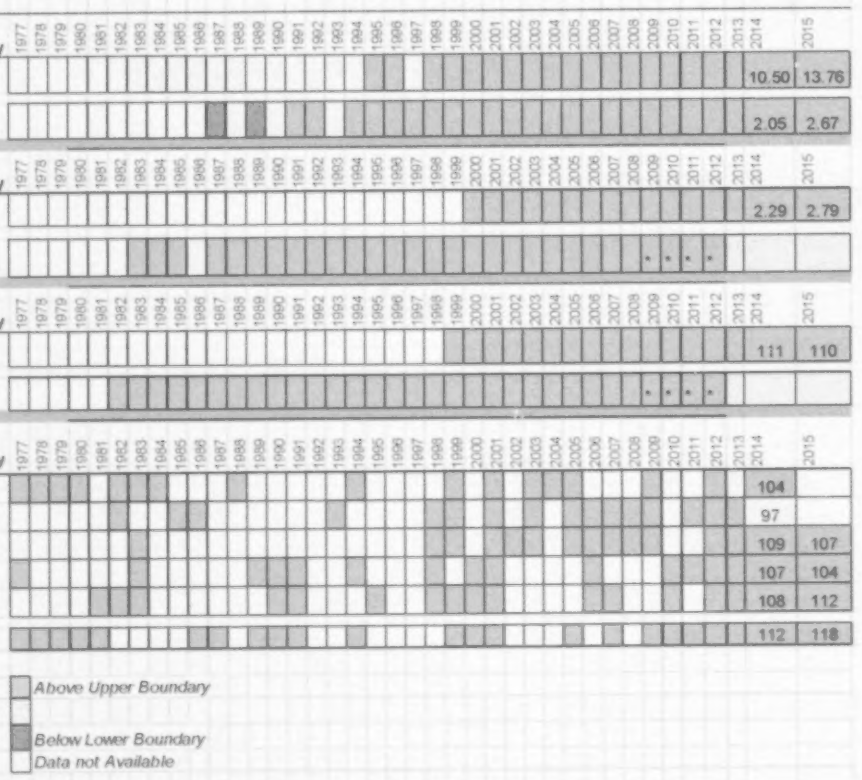



*Figure 2. Landings (t) for LFA 41 from 2002-2014 against TAC of 720 t.*

The stratified mean number of lobsters per tow from the DFO Maritimes Region Winter RV trawl survey (5Z) in recent years are among the highest on record. The upper boundary is based on 50% of the median survey catch of the 1995-2009 period (0.35) and the lower boundary is based on 40% of the median survey catch of the 1987-1994 period (0.07). For 2015, the 3-year moving average is 2.67 lobsters per tow, which is above the upper boundary and a slight increase from the 2014 value.

| | | | Upper Boundary | Lower Boundary | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Abundance | Mean#/Tow | Mean #/Tow 4X Maritime Region Summer RV Survey | 1.48 | 0.16 | 10.50 | 13.76 |
| | | Mean #/Tow 5Z Maritime Region Winter RV Survey | 0.35 | 0.07 | 2.05 | 2.67 |
| Abundance | Large Size Females >140 | | Upper Boundary | Lower Boundary | 2014 | 2015 |
| | | Mean #/Tow 4X Maritime Region Summer RV Survey | 0.27/tow | | 2.29 | 2.79 |
| | | Mean #/Tow 5Z NMFS Fall RV Survey | 0.12/tow | 0.06/tow | | |
| Median Size | Female Median Size Trawl based | | Upper Boundary | Lower Boundary | 2014 | 2015 |
| | | Median female 4X Maritime Region Summer RV Survey | 106 | 95 | 111 | 110 |
| | | Median female 5Z NMFS Fall RV Survey | 97 | 95 | | |
| Median Size | Female Median Size At sea sample Based | | Upper Boundary | Lower Boundary | 2014 | 2015 |
| | | 4X-SW Browns Spring | 101 | 95 | 104 | |
| | | 4X-SW Browns Fall | 99.3 | 95 | 97 | |
| | | 4X-Georges Basin Winter | 102.3 | 95 | 109 | 107 |
| | | 4X-Georges Basin Spring | 102 | 95 | 107 | 104 |
| | | 4X-SE Browns Spring | 106 | 95 | 108 | 112 |
| | | 5Z Georges Spring | 108 | 95 | 112 | 118 |




* Correction Factors for the new trawl design and survey protocol being developed but not yet applied. Indicators will remain above the Upper Boundary level

*Figure 3. Primary indicators in the offshore lobster (LFA 41) fishery.*

### Large Female Size

The mean number per tow of females greater than or equal to 140 mm carapace length (CL) in the DFO Maritimes Region Summer trawl survey (4X; 1999-2015) is an abundance indicator, but also a proxy for both exploitation rate and reproductive potential. Small sample sizes in the trawl surveys add caution to the interpretation of this indicator. The upper boundary is 80% of the minimum value of the time series (0.27). For 2015, the 3-year moving average is 2.79, which is above the upper boundary and a slight increase from the 2014 value.

### Median Female Size

The median female size indicators proposed in the last stock assessment (DFO 2014), based on trawl surveys and at-sea samples, are proxies for exploitation rate and reproductive potential. As indicated above, indicators from the U.S. RV trawl survey are not updated in this science response.

In 4X, the proposed upper boundary for median female size based on the Maritimes Region RV survey is the midpoint between the median size for the reference period (1999-12, 106 mm CL), and the lower boundary, which is the size at 50% maturity, historically estimated as being 95 mm CL. Similar to the the previous indicator, the 3-year moving average was used to place the current estimate relative to the boundaries for median female size. For the 2015 fishing year, this metric is 110 mm CL, which is a 1 mm CL decrease from the 2014 value but still above the upper boundary.

The proposed upper boundary for median female size based on at-sea samples is also the midpoint between the median size for the reference period (1977–2012) and the lower boundary is the size at 50% maturity (95 mm CL). Unlike other indicators, the at-sea sample time series is interrupted by years with no available data; therefore, a 3-year moving average cannot be applied as the metric. Alternatively, the metric is the median female size specific to each time period and location selection (Figure 3). Median values for 4X-Southeast Browns (Spring) and 5Z-Georges (Spring) show an increase in median size in 2015, while for 4X-Georges Basin (Winter and Spring) a slight decrease in the median is observed. All of these are still above the upper boundary. Two indicators, 4X-Southwest Browns (Spring and Fall), were not updated as the sampling has not yet occurred for 2015 (November-December).

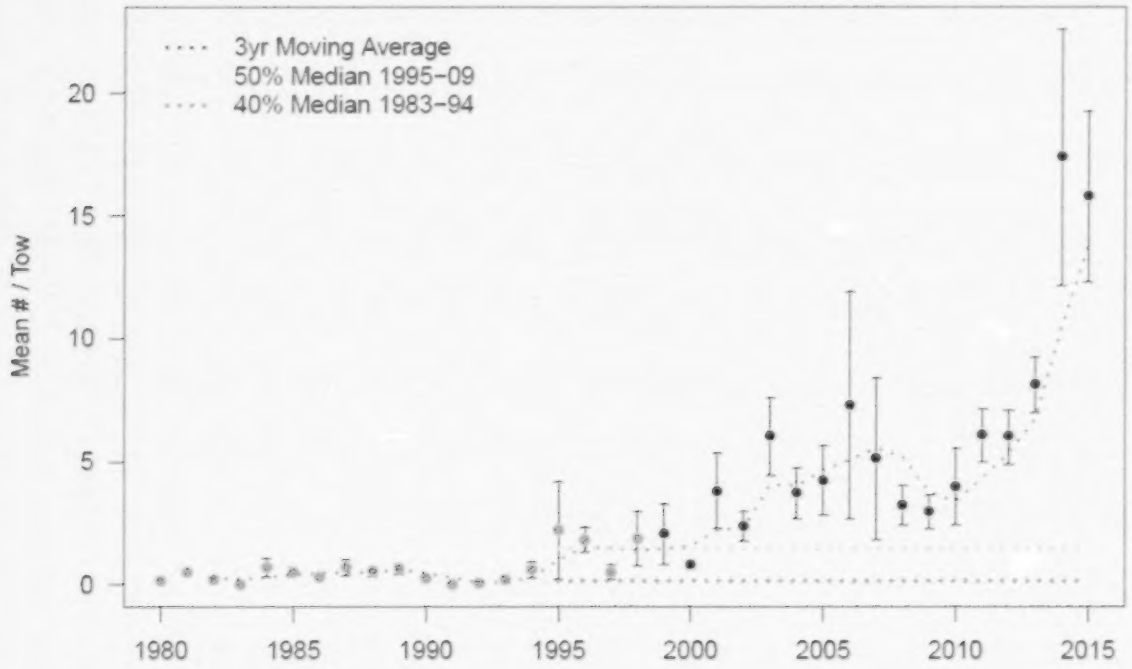



*Figure 4. Stratified mean number of lobsters per tow with standard errors and a 3-year moving average from the DFO Maritimes Region Summer RV trawl survey in 4X (Strata 477-484). Red circles (1980-1998) represent the historical reported means and standard errors.*

## Conclusions

Figure 3 uses a traffic light approach to display where the annual value falls relative to the upper and lower boundaries defined for each primary indicator used to assess stock status. The 2015 abundance indicators are above the upper boundary for the LFA 41.The size indicators for the 2015 trawl-based 3-year mean and the at sea sample medians for 4X are above the upper boundary. Given that all the indicators are providing similar signals, there is confidence that stock abundance remains high.

Following the framework used in DFO (2014), the LFA 41 lobster fishery is judged to be in the healthy zone.

## Contributors

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## Sources of Information

DFO. 2014. Assessment of Lobster (*Homarus americanus*) in Lobster Fishing Area 41 (4X + 5Zc). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/034 (Revised).

Pezzack, D.S., C. Denton, M. Cassista-Da Ros, and M.J. Tremblay. 2015. Assessment of the Canadian LFA 41 Offshore Lobster (*Homarus americanus*) Fishery (NAFO Divisions 4X + 5Zc). DFO Can. Sci. Advis. Sec. Res. Doc. 2015/066.

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*MPO. 2016. Homard (Homarus americanus) de la zone de pêche du homard 41 (4X + 5Zc) : Mise à jour sur l'état du stock de 2015. Secr. can. de consult. sci. du MPO, Rép. des Sci. 2016/004.*